

August 12, 2015



U.S. Department
of Transportation

East Building, PHH-30
1200 New Jersey Avenue S.E.
Washington, D.C. 20590

**Pipeline and Hazardous
Materials Safety Administration**

DOT-SP 15515
(THIRD REVISION)

EXPIRATION DATE: March 31, 2018

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: National Aeronautics and Space Administration (NASA)
Houston, TX
2. PURPOSE AND LIMITATION:
 - a. This special permit authorizes the transportation in commerce of a non-DOT specification carbon composite overwrapped pressure vessel without an active pressure relief device (PRD), further packed either within an ATA-300 Category-1 outer packaging while charged to operating pressure, or within an alternate packaging when at pressure at or below 150 psia. This special permit provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein. The most recent revision supersedes all previous revisions.
 - b. The safety analyses performed in the development of this special permit only considered the hazards and risks associated with the transportation in commerce.
 - c. Party status will not be granted to this special permit.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.301(a)(1) and 173.302a(a) in that a non-DOT Specification cylinder is not authorized; §§ 173.301(f)(1) and 173.302(f)(2) in that a pressure relief device is required on a cylinder filled with gas; § 173.302(f)(4) in that a thermal resistance test for the rigid outer packaging is required; and § 173.301(h)(3) in that cylinder valve protection must be performance tested, except as provided herein.

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5. BASIS: This special permit is based on the application of National Aeronautics and Space Administration (NASA) dated September 22, 2014 submitted in accordance with § 107.105 and the public proceeding therein and additional information dated August 6, 2015.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous Materials Description			
Proper Shipping Name	Hazard Class/ Division	Identification Number	Packing Group
Air, compressed	2.2	UN1002	N/A
Nitrogen, compressed	2.2	UN1066	N/A
Oxygen, compressed	2.2	UN1072	N/A

7. SAFETY CONTROL MEASURES:

- a. PACKAGING - Prescribed packaging consists of two main components, a pressure vessel and a valve assembly with quick disconnect fitting.

1. Pressure Vessel - The pressure vessel is a filament wound Carbon Composite Overwrapped Pressure Vessel (COPV) designed and tested to NASA component envelope drawing 684-014494 on file with the Approvals and Permits Division. The liner is designed to be non-load sharing. It is manufactured from Nickel alloy 718 for high pressure oxygen compatibility and is formed by welding two forged domes with integral bosses to the cylindrical section. The composite overwrap utilizes Toray T1000 carbon fiber and Alliant Technical Systems (ATK) CLRF-100 epoxy resin.

The nominal volumetric capacity of the pressure vessel is approximately 2.68 cubic feet (75.9 liter) with a maximum design pressure, MDP, of 7,000 psi. Each pressure vessel is hydrostatically proof pressure tested to 10,500 psi and has a minimum required burst pressure of 20,400 psi. Each pressure vessel will be filled to a maximum gas density associated with a pressure of 6,000 psi at 72°F.

2. Valve Assembly - The valve assembly is designed and tested to NASA component envelope drawing 683-98113 on file with the Approvals and Permits Division. It is a Monel housed toggle isolation valve with integrated pressure gauge, burst disc (which is deactivated during transportation), quick disconnect fitting and depress disconnect capability. The valve assembly has a maximum design pressure (MDP) of 7000 psi, a proof test pressure of 10,500 psi, and a minimum required burst pressure of 17,500 psi. All valve assemblies must pass NASA's compatibility acceptance testing for high pressure oxygen service. The integrated burst disc is made of Nickel 200 alloy. When active (undefeated), it is set to rupture between the pressures of 8200 - 8900 psi.

b. REQUALIFICATION - No periodic requalification is required for these pressure vessels. However, prior to filling, each pressure vessel must be visually examined in accordance with Boeing's Pressure Vessel Damage Control Plan, D684-14656-01 Rev C.

c. OPERATIONAL CONTROLS:

1. Transportation by surface, water or air will be on specifically contracted carriers that have been informed of the issues necessary to ensure safety of the shipment, the carrier, and the general public.

2. When charged to operating pressure, the pressure vessels will only be shipped in ATA-300 Category-1 shipping containers (rigid outer packaging) as described in NASA's application on file with the Approvals and Permits Division.

3. When pressurized at or below 150 psia, the pressure vessels will be shipped in outer shipping containers as follows:

- i. In an oxygen compatible foam lined glass cloth bag per NASA envelope drawing 684-015313 (VIA bag) while stowed inside the SpaceX Dragon return vehicle; or

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ii. In a VIA bag as above while further stowed inside a foam lined plywood crate. This transport container will not be used for shipment of compressed oxygen by aircraft.

4. Each pressure vessel shipped under the terms of this special permit must be plainly and durably marked "DOT-SP 15515".

5. The pressure vessels have a maximum design service life of 7 years and a maximum shelf life of 15 years.

8. SPECIAL PROVISIONS:

a. A person who is not a holder of this special permit who receives a package covered by this special permit may reoffer it for transportation provided no modification or change is made to the package and it is reoffered for transportation in conformance with this special permit and the HMR.

b. A current copy of this special permit must be maintained at each facility where the package is offered or reoffered for transportation.

c. Prior to first shipment of pressure vessels under the terms of this special permit, the qualification tests outlined in NASA's application must be completed with satisfactory results. The test results must be submitted to the Approvals and Permits Division and be acknowledged in writing.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, and cargo aircraft only. See restrictions under paragraph 7.c.

10. MODAL REQUIREMENTS: A current copy of this special permit must be carried aboard each cargo vessel, aircraft, or motor vehicle used to transport packages covered by this special permit. The shipper must furnish a copy of this special permit to the air carrier before or at the time the shipment is tendered.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this special permit and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

- o All terms and conditions prescribed in this special permit and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
- o Persons operating under the terms of this special permit must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.
- o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this special permit must receive training on the requirements and conditions of this special permit in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this special permit, including display of its number, when this special permit has expired or is otherwise no longer in effect.

Under Title VII of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)—"The Hazardous Materials Safety and Security Reauthorization Act of 2005" (Pub. L. 109-59), 119 Stat. 1144 (August 10, 2005), amended the Federal hazardous materials transportation law by changing the term "exemption" to "special permit" and authorizes a special permit to be granted up to two years for new special permits and up to four years for renewals.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this special permit are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 - Immediate notice of certain hazardous

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materials incidents, and 171.16 - Detailed hazardous materials incident reports. In addition, the grantee(s) of this special permit must notify the Associate Administrator for Hazardous Materials Safety, in writing, of any incident involving a package, shipment or operation conducted under terms of this special permit.

Issued in Washington, D.C.:



for Dr. Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Material Safety Administration, U.S. Department of Transportation, East Building PHH-30, 1200 New Jersey Avenue, Southeast, Washington, D.C. 20590.

Copies of this special permit may be obtained by accessing the Hazardous Materials Safety Homepage at http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm. Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

PO: RS/ae